

What we claim is:

1. A process for injection-foaming a thermoplastic resin by using an injection molding machine with a two-stage-compression screw to which a physical foaming agent is fed from the middle of the cylinder, which comprises:

(1) the physical foaming agent is fed into the cylinder from the storage tank at a pressure lower than storage pressure by a pressure difference between the storage tank and the injection molding machine cylinder;

(2) the aforesaid foaming agent is fed within the range from the starting point of the second stage of the screw to a length nine times the outside diameter of the screw in the direction of injection at the time of the screw caused to advance most forward in the direction of injection; and

(3) a foam is obtained by making the pressure in a cavity of the mold in the injection molding machine at low pressure including practically atmosphere pressure, injecting the resin into the cavity, and then expanding the volume of the cavity.

2. An injection foaming process according to Claim 1 wherein the volume of cavity is expanded by retracting the metal plates in the mold after injecting and filling the resin into the cavity.

3. An injection foaming process according to Claim 1 or 2 wherein the ratio of $L2/L1$, between the depth of the last groove of the first stage of the two-stage-compression screw of the aforesaid injection molding machine, $L1$, and the depth of the first groove of the second stage of the aforesaid two-stage-compression screw, $L2$, is in the range of 1.2 to 6.

4. An injection foaming process according to any one of Claims 1 to 3 wherein the physical foaming agent is lower in pressure at not more than 80% of the storage pressure and is in gas state or in supercritical condition.

5. An injection foaming process according to any one of Claims 1 to 4 wherein a

resin check valve is installed at the part at which the physical foaming agent is injected into the injection molding machine.

6. An injection foaming process according to any one of Claims 1 to 5 wherein the physical foaming agent is carbon dioxide, nitrogen or argon.

5 7. An injection molding machine for thermoplastic resins which has:

(1) A physical foaming agent tank;

(2) A two-stage-compression screw;

(3) A cylinder having a physical foaming agent feeding part in the range from the starting point of the second stage of the screw to a length nine times the outside diameter of the screw in the direction of injection at the time of the screw caused to advance most forward in the direction of injection; and

(4) A mold capable of expanding the volume of the cavity.

8. An injection foaming process according to Claim 7 wherein the ratio of $L2/L1$, between the depth of the last groove of the first stage of the two-stage-compression screw of the aforesaid injection molding machine, $L1$, and the depth of the first groove of the second stage of the aforesaid two-stage-compression screw, $L2$, is in the range of 1.2 to 6.

9. An injection foaming process according to Claim 7 or 8 wherein a resin check valve is installed at the part at which the physical foaming agent is injected into the injection molding machine.

10. A resin composition suitable for the injection foaming process defined in any one of Claims 1 to 6 which comprises a thermoplastic resin containing as a foaming nucleator 0.1 to 5 wt% of an inorganic filler having an average particle diameter of 0.5 to 10 μm to the thermoplastic resin and/or 0.01 to 1 wt%,

calculated as undecomposed material, of a chemical foaming agent or its decomposed material.

11. A resin composition according to Claim 10 wherein the aforesaid inorganic filler is talc, silica, calcium carbonate or barium sulfate.

12. A resin composition according to Claim 10 wherein the chemical foaming agent is a mixture of polycarboxylic acid and hydrogencarbonate at a ratio of 0.1:0.9 to 0.9 : 0.1 or its decomposed material.

13. A resin composition according to Claim 10 or 12 wherein the chemical

5 foaming agent is a mixture of citric acid and sodium hydrogencarbonate at a ratio of 0.1:0.9 to 0.9 to 0.1 or its decomposed material.

14. A resin composition according to any one of Claims 10 to 13 wherein the thermoplastic resin is a polyolefin.

15. An injection foaming process according to any one of Claims 1 to 6 wherein

10 the resin compositions defined in any of Claims 10 to 14 is used as the thermoplastic resin.

16. An injection foaming process wherein the cavity volume is expanded while the melted resin of the resin compositions defined in any one of Claims 10 to 14 which is mixed with a physical foaming agent is being injected into the cavity
15 whose volume is initially set at a lower value than the quantity of the metered resin.

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